at1124exam: Radicals and Squares (v802)

Question 1

Simplify the radical expressions.

$$\sqrt{20} \qquad\qquad \sqrt{28} \qquad\qquad \sqrt{8}$$

$$\sqrt{2 \cdot 2 \cdot 5} \qquad\qquad \sqrt{2 \cdot 2 \cdot 7} \qquad\qquad \sqrt{2 \cdot 2 \cdot 2}$$
$$2\sqrt{5} \qquad\qquad 2\sqrt{7} \qquad\qquad 2\sqrt{2}$$

Question 2

Find all solutions to the equation below:

$$2(x + 10)^2 - 4 \;=\; 94$$

First, add 4 to both sides.
$$2(x + 10)^2 = 98$$

Then, divide both sides by 2.
$$(x + 10)^2 = 49$$

Undo the squaring. Remember the plus-minus symbol.

$$x + 10 = \pm 7$$

Subtract 10 from both sides.
$$x = -10 \pm 7$$

So the two solutions are $x = -3$ and $x = -17$.

Question 3

By completing the square, find both solutions to the given equation. *You must show work for full credit!*

$$x^2 + 8x \;=\; 65$$

$$x^2 + 8x + 16 = 65 + 16$$
$$x^2 + 8x + 16 = 81$$
$$(x+4)^2 = 81$$
$$x + 4 = \pm 9$$
$$x = -4 \pm 9$$
$$x = 5 \qquad \text{or} \qquad x = -13$$

Question 4

A quadratic polynomial function is shown below in standard form.

$$y \;=\; 3x^2 - 30x + 84$$

Express the function in **vertex form** and identify the **location** of the vertex.

From the first two terms, factor out 3 .

$$y = 3(x^2 - 10x) + 84$$

We want a perfect square. Halve -10 and square the result to get 25 . Add and subtract that value inside the parentheses.

$$y = 3(x^2 - 10x + 25 - 25) + 84$$

Factor the perfect-square trinomial.

$$y = 3((x-5)^2 - 25) + 84$$

Distribute the 3.

$$y = 3(x-5)^2 - 75 + 84$$

Combine the constants to get **vertex form**:

$$y = 3(x-5)^2 + 9$$

The vertex is at point $(5, 9)$.